Structural, magnetic and electrical properties of PrMnO3/Pr0.67Ba0.33MnO3 single and bi-layer thin films

ABSTRACT

The single and bi-layer manganite thin film of PrMnO3 (PMO) and Pr0.67Ba0.33MnO3 (PBMO) were fabricated on single crystal MgO oriented (100) substrate via pulsed laser deposition technique. In this work, the importance of stacking sequence in bi-layer manganite films of PMO and PBMO was reported. The unit cell of PMO experienced negative misfit when growth on PBMO layer and positive misfit for the unit cell of PBMO growth on PMO. Modification of magnetic interaction was observed from the deduction of arrangement in magnetic spins ordering altered by deformation of crystal structure as well as the magnetic pinning effect among PMO and PBMO. The conducting route of PMO/PBMO or PBMO/PMO was follow PBMO layer which is lower in resistance. The highest %MR obtained from bi-layer films are lower compared to single layer PBMO (-50.0 % at 80Kin 10kG magnetic field). The stacking sequence of PMO/PBMO promises higher %MR than PBMO/PMO.

Keyword: Colossal magnetoresistance; Magnetism; Bi-layer thin film; Structure; Microstructure